

REMARKS

In response to the Office Action, Claim 1 is amended and Claim 8 is added. Claims 1-8 remain in the Application. Reconsideration of the pending claims is respectfully requested in view of the above amendments and the following remarks.

I. Examiner Interview Summary

An Examiner Interview was conducted on February 27, 2008 to discuss proposed amendments to Claim 1 and new Claim 8. The Examiner indicated that the proposed amendment “having one end connecting to the substrate” seems to be contradictory to the prior amendment “having at least two ends connecting to the substrate.” The Examiner further indicated that the “current density” in new Claim 8 needs to be further clarified. No agreement was reached at the time of the interview.

Applicants submit that the specification at lines 3-7, page 7 describes that “each nanotube fiber may have one end connect to the surface of a plate-like metal member or the wall of a through hole, and curved and entangled with one end of another nanotube fiber.” Thus, the specification supports that each nanotube fiber has one end connecting to the substrate, as currently recited in Claim 1. As the open ends of the nanotube fibers may be curved and entangled with each other, a curled and entangled nanotube fiber (e.g., formed by two nanotube fibers entangled together) may have two ends connecting to the substrate. Thus, the current and prior amendments recite different aspects of the invention and are not contradictory to each other.

As requested by the Examiner, Applicants further clarify the term “peak current density” in new Claim 8.

II. Claims Rejected Under 35 U.S.C. § 112

Claims 1-7 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Claims 1-7 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

Claims 1-7 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Applicants amend Claim 1 to remove the term “having at least two ends connecting to the substrate.” Accordingly, withdrawal of the rejection is respectfully requested.

III. Claims Rejected Under 35 U.S.C. § 103(a)

Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2001/0028209 to Uemura et al. (“Uemura”) in view of U.S. Patent Publication No. 2002/0003453 to Shin et al. (“Shin”) and further in view of U.S. Patent Publication No. 2004/0095050 to Liu et al (“Liu”).

To establish a *prima facie* case of obviousness, the relied upon references must teach or suggest every limitation of the claim such that the invention as a whole would have been obvious at the time the invention was made to one skilled in the art.

Claim 1 is amended to consistently use the term “curled and entangled nanotube fibers.” Applicants submit that the cited references do not teach or suggest “creating a plurality of curled and entangled nanotube fibers . . . from at least one of the curled and entangled nanotube fibers by the laser beam,” as recited in Claim 1.

The cited references do not disclose “creating a plurality of curled and entangled nanotube fibers . . . from at least one of the curled and entangled nanotube fibers by the laser beam.” There is no indication in any of the references that a laser beam can create curled and entangled nanotube fibers from existing nanotube fibers, thus increasing the total number of the curled and entangled nanotube fibers. The Examiner indicates that “Liu also discusses freeing more ends of nanotubes by this procedure [of paragraph 0024] because the tips of the invention contribute to a decreased threshold voltage required for field emission (paragraph 0026).” However, paragraph 0026 of Liu indicates that it is the tapered **shape** of tips 122’ that contributes to a decrease in threshold voltage. As indicated in paragraph 0007 of Liu, the problem that Liu tries to solve is a field emission device that has a dense configuration. A dense configuration induces shielding between adjacent carbon nanotubes, reduces field concentration and efficiency, and increases a threshold voltage of field emissions (paragraph 0007 of Liu). The solution

proposed by Liu is to shape the tips of the nanotubes to improve a densely-configured field emission device. Liu does not disclose the **number** of carbon nanotubes having a free end can be increased or decreased by the use of laser. Thus, Applicants respectfully disagree with the Examiner's analysis of Liu.

Moreover, in Uemera, the surface of the coating film 12 constituted by carbon nanotubes already has a smooth surface (see lines 9-11, paragraph 0073 and line 4, paragraph 0075). Further, Uemera does not disclose or suggest that the surface of the coating film 12 needs to be flattened. Thus, a person of ordinary skill in the art would not be motivated to combine the coating film 12 of Uemera with the laser beam of Liu to smooth the surface of the coating film 12.

Shin is relied on for disclosing connecting the nanotube fibers at both ends. However, Shin does not disclose "creating a plurality of curled and entangled nanotube fibers . . . from at least one of the curled and entangled nanotube fibers by the laser beam," as recited in Claim 1. Thus, Claim 1 and its dependent claims, namely, Claims 2-7, are non-obvious over the cited references. Accordingly, Applicants respectfully request that the § 103 rejection of Claims 1-7 be withdrawn.

Applicants add new Claim 8 to recite the feature of "irradiating the film on the substrate with a laser beam perpendicularly to the substrate, wherein the step of irradiating increases the number of the entangled nanotube fibers having a free end and reduces a peak current density emitted by the entangled nanotube fibers, the peak current density measured at measurement points located at a predetermined interval in both X and Y directions of the substrate" (emphasis added). Support for Claim 8 can be found, for example, at lines 4-18, page 10 of the specification.

Applicants submit that none of the cited references teach or suggest these features. The structure of Liu reduces shielding between adjacent carbon nanotubes, decreases threshold voltage for field emission, and increases field concentration and efficiency (Abstract). None of these effects do not teach or suggest a reduction of **a peak current density** emitted by the entangled nanotube fibers, where the peak current density is measured at measurement points located at a predetermined interval in both the X and the Y directions of the substrate. Thus, not only the means employed by Liu is different from the claimed invention (shaping tips vs. increasing numbers), but the results obtained by Liu are also different from the claimed

invention. Uemera and Shin do not teach or suggest these features. Thus, Applicants request that Claim 8 be allowed.

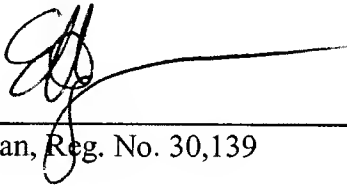
CONCLUSION

In view of the foregoing, it is believed that all claims are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666.

Respectfully submitted,

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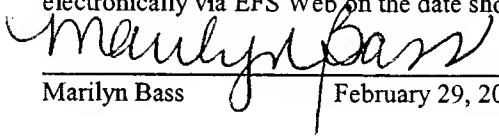


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